



Fluid Replacement

Overview



- **Functions of Water**
- **Maintaining Water Balance**
- **Water Loss**
- **Fluid Requirements**
- **What Should You Drink**
- **Fluid Replacement and Performance**



H₂O Facts



- **An essential nutrient**
- **Most abundant component of the human body**
60 - 70% of body weight is water
- **Must be consumed regularly to ensure normal body function**



Functions of H₂O



- **Promotes digestion and nutrient absorption**
- **Carries nutrients and oxygen to cells**
- **Assists waste excretion**
- **Maintains blood circulation**
- **Regulates body temperature**





Maintaining Water Balance



**Water is lost
in:**

- Sweat**
- Urine**
- Stools**

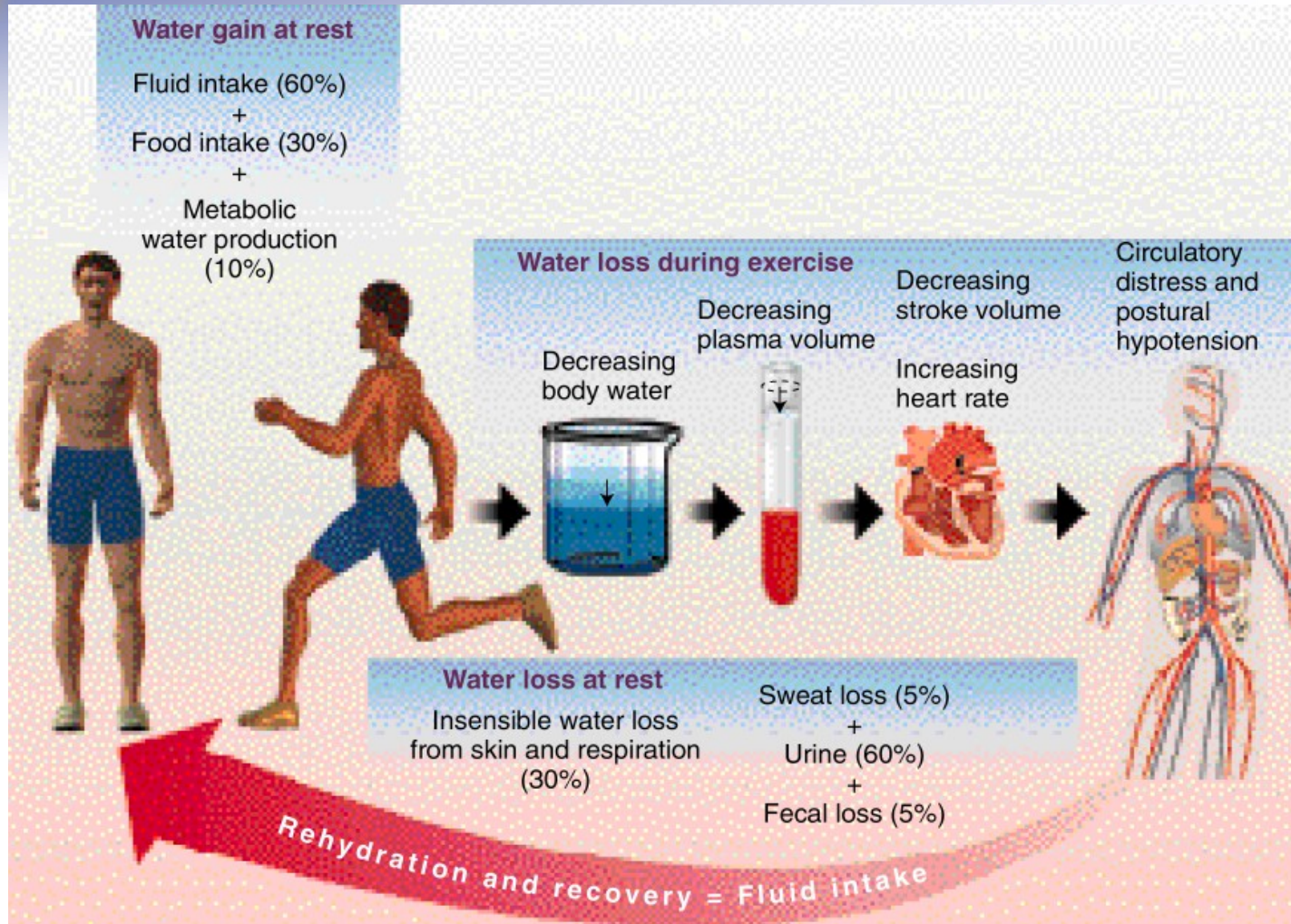
**Water is gained
from:**

- Beverages**
- Foods**
- Metabolism**

Balance: Output vs. Input

CHAMP Fluid Balance Equation

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CHAMP Signs and Symptoms of Dehydration

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- **Thirsty**
- **Dry mouth**
- ✂️ **↓ urine output**
- ✂️ **↓ physical performance**
- **Headache**
- **Difficulty concentrating**
- **Sleepiness**





Indices of Hydration



	% Body Weight Change	Urine Color
Well Hydrated	-1 to +1%	1 or 2
Minimal Dehydration	-1 to -3%	3 or 4
Significant Dehydration	-3 to -5%	5 or 6

Good Foods for Fluid Replacement



- **Strawberries**
- **Watermelon**
- **Grapes**
- **Oranges**
- **Grapefruit**



- **Celery**
- **Tomatoes**
- **Cucumbers**
- **Radishes**
- **Lettuce**

When is Water Lost?



- **Any strenuous exercise**
- **Low to moderate exercise > 60 minutes**
- **Work in hot environment**
- **Exposure to altitude**
- **Immersion in water**
- **Drinking too much alcohol and caffeine**





Restoration of Fluid Balance



- **Weigh yourself before and after exercise**
- **Calculate body weight lost in lbs**
- **Drink (or eat fruit) to replace fluid losses**

Weight Lost (lbs)	Fluid to be Replaced (oz/cups)
1	20-24 (2.5-3 cups)
2	40 to 48 (5-6 cups)
4	80-96 (10-12 cups)
8	160-192 (20-24 cups)



Monitoring Hydration

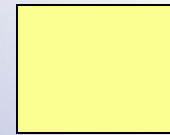


Urine color test for dehydration

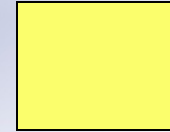
Lemonade—The

Apple juice—The

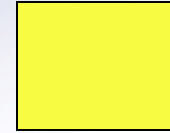
Tea—The ugly



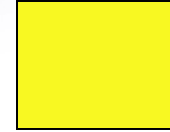
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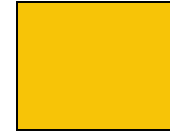
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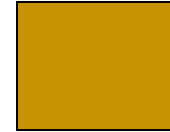
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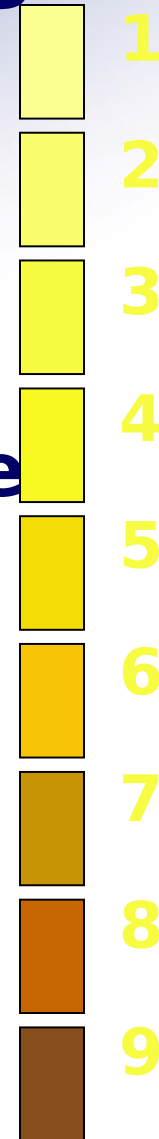




General Guidelines



- **Drink enough so urine is pale yellow**
- **Drink liquids before exercise or missions**
- **Always drink when thirsty**
- **Rely first on thirst, then on body weight**

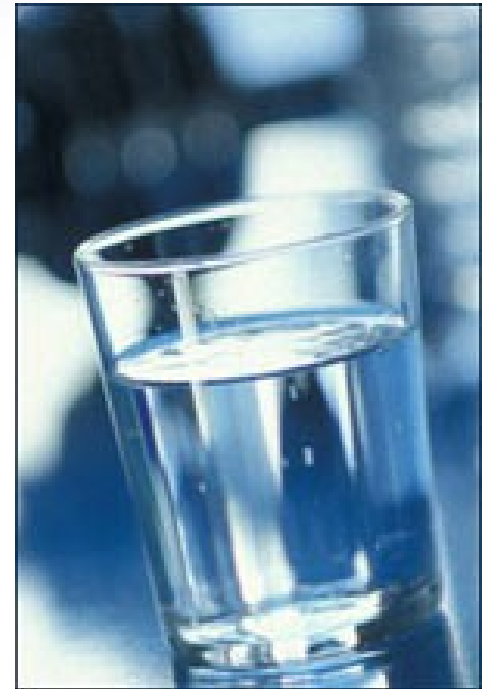




Fluid Requirement S



- **Drink 1-2 cups of fluids 60 minutes before a training session**
- **Drink 1 cup of a 5 - 8 % CHO drink every 30 minutes during exercise lasting > 60 minutes**
- **Try commercial fluid replacement beverages or diluted juices during training sessions lasting over 60 minutes**



Electrolyte Balance



- Training in hot weather demands more sodium and potassium (*electrolytes*)
- Hyponatremia occurs as a result of low blood sodium when water is consumed in large amounts
- Symptoms of hyponatremia:
 - Severe headaches
 - Diarrhea
 - Nausea
 - Convulsions
 - Death





Electrolyte Balance



- **Drinking too much water over prolonged exercise without replenishing electrolytes is possible**
- **Balance electrolytes by:**
 - **Eating pretzels and fruit**
 - **Using products that provide electrolytes**





Beverages You Drink Should:



- **Taste good**
- **Empty quickly from the stomach**
- **Provide CHO, if exercise > 60 min**
- **Contain a small amount of sodium**
- **Be cool (10° C)**





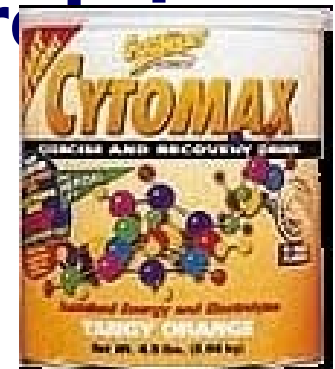
Criteria for Off-The-Shelf Beverages



- **Carbohydrate:**
 - < 95 kcal/8 oz
 - 9 - 19 g/8 oz
- **CHO to Protein Ratio > 4:1**
- **No carbonation**



- **Sodium:**
 - 40 - 240 mg/8 oz
- **No substances other than CHO, electrolytes, and protein**



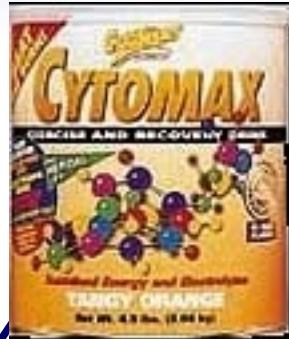
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Brands of Beverages



- Accelerade
- All Sport
- CeraSport
- Cytomax
- Endurox R4
- Gatorade
- G-Push G1 Hydration Formula



- GU₂₀
- Hydrade
- Metabolol Endurance
- Met-Rx ORS
- Powerade
- Pro-Hydr
- Ultima



Deuster/Kemmer/Tubbs/Zen



Fluid Replacement Beverages



Products	Energy kcal/8 oz	CHO g/8 oz	CHO:Pro $\geq 4:1$	Sodium mg/8oz
CarboPack Beverage	94	19	-	55-160
Cerasport	76	13	-	102
Gatorade Original	50	14	-	110
Gookinade	86	10	-	64
GU20	50	13	-	120



Fluid Replacement Beverages



Products	Energy kcal/8 oz	CHO g/8 oz	CHO:Pro ≥ 4:1	Sodium mg/8oz
MetRx ORS	75	19	-	125
Powerade	72	19	-	53
Power Bar Endurance Sports Drink	70	17	-	160
Gatorade Endurance	50	14	-	200

Key Points



- **Water is essential for life**
- **Fluid lost during exercise must be replaced through fluid/food intake**
- **Hydration and electrolyte replacement are essential to optimum performance**
- **Products containing carbohydrate and electrolyte are helpful when exercise is > 60 min**

